WHAT IS CLAIMED IS:

1. A synthetic gas manufacturing plant comprising:

a reformer having a reaction tube, a combustion radiation unit arranged around the reaction tube to heat the reaction tube, and a convection unit communicating with the combustion radiation unit;

a source gas supply passageway to supply a natural gas to the reformer;

a steam supply passageway to supply steam to the source gas supply passageway;

a carbon dioxide recovery apparatus to which a total amount of combustion exhaust gas flowing through the convection unit of the reformer is supplied, and which recovers carbon dioxide from the combustion exhaust gas;

a compressor to compress the recovered carbon dioxide; and

a return passageway to supply part or the whole of the compressed carbon dioxide from the compressor to the source gas supply passageway.

2. A plant according to claim 1, wherein passageway area varying means is placed in the convection unit, and supplies the total amount of combustion exhaust gas flowing in the convection unit to the carbon dioxide recovery apparatus.

3. A plant according to claim 1, wherein the

compressor is driven by a steam turbine.

4. A plant according to claim 3, which further comprises a heat exchanger to generate steam by exchanging heat between a synthetic gas synthesized by the reformer and water, and a passageway to supply the steam to the steam turbine.

5. A plant according to claim 3, which further comprises a passageway to generate steam by exchanging heat with water in the convection unit of the reformer, and supply the steam to the steam turbine.

6. A synthetic gas manufacturing method comprising steps of:

providing a synthetic gas manufacturing plant which comprises

(a) a reformer having a reaction tube, a combustion radiation unit arranged around the reaction tube to heat the reaction tube, and a convection unit communicating with the combustion radiation unit,

(b) a source gas supply passageway to supply a natural gas to the reformer,

(c) a steam supply passageway to supply steam to the source gas supply passageway,

(d) a carbon dioxide recovery apparatus to which a total amount of combustion exhaust gas flowing through the convection unit of the reformer is supplied, and which recovers carbon dioxide from the combustion exhaust gas,

(e) a compressor to compress the recovered carbon dioxide, and

(f) a return passageway to supply part or the whole of the compressed carbon dioxide from the compressor to the source gas supply passageway;

recovering, by the carbon dioxide recovery apparatus, carbon dioxide in the total amount of combustion exhaust gas which is exhausted from the combustion radiation unit of the reformer, and flows in the convection unit;

compressing the carbon dioxide recovered by the carbon dioxide recovery apparatus by the compressor; and

supplying part or the whole of the compressed carbon dioxide to the source gas supply passageway through the return passageway, and supplying steam to the source gas supply passageway through the steam supply passageway, thereby supplying a gas mixture of the natural gas, compressed carbon dioxide, and steam, as a source gas, to the reaction tube externally heated by the combustion radiation unit of the reformer.

7. A method according to claim 6, wherein the total amount of combustion exhaust gas flowing in the convection unit is supplied to the carbon dioxide recovery apparatus by passageway area varying means placed in the convection unit.

8. A method according to claim 6, wherein steam

is generated by exchanging heat between a synthetic gas synthesized by the reformer and water by a heat exchanger, and supplied to a steam turbine of the compressor to drive the steam turbine.

9. A method according to claim 6, wherein steam is generated by exchanging heat with water in the convection unit of the reformer, and supplied to a steam turbine of the compressor to drive the steam turbine.

10. A method according to claim 6, wherein a portion of the compressed carbon dioxide not used as a source gas is supplied into the ground and fixed therein.

11. A method according to claim 6, wherein the manufactured synthetic gas is used in synthesis of methanol, synthesis of dimethylether, or synthesis of gasoline, kerosene, and light oil in a Fischer-Tropsch reaction system.